Claims

What is claimed is:

1. An apparatus for measuring a parameter of a process flow flowing within a pipe, the apparatus comprising:

a first meter portion for providing a meter measurement signal indicative of a parameter of the flow propagating through the pipe;

a second meter portion including a sensor for providing sound measurement signal indicative of the speed of sound propagating within the pipe; and

a processor for providing a compensated meter measurement signal indicative of a measurement parameter corrected for entrained gas in the flow propagating through the pipe, in response to meter measurement signal and the sound measurement signal.

2. The apparatus of claim 1, wherein the second meter portion includes at least two pressure sensors at different axial locations along the pipe, each of the pressure sensors providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position, wherein the processor, responsive to said pressure signals, provides a signal indicative of the gas volume fraction of the process flow flowing within the pipe.

2. The apparatus of claim 1, wherein the process flow is one of a liquid having entrained gas, a mixture having entrained gas, and a slurry having entrained gas.

3. The apparatus of claim 1, wherein the first meter portion includes at least two pressure sensors at different axial locations along the pipe, each of the pressure sensors providing a respective pressure signal indicative of a pressure disturbance within the pipe at a corresponding axial position, wherein the processor, responsive to said pressure signals, provides a signal indicative of the volumetric flow of the process flow flowing within the pipe.

4. The apparatus of claim 1, wherein the first meter portion is a volumetric flow meter and the meter measurement signal is indicative of the volumetric flow of the process flow.

5. The apparatus of claim 4, wherein the volumetric flow meter is an electromagnetic flow meter.

6. The apparatus of claim 1, wherein the first meter portion is a consistency flow meter and the meter measurement signal is indicative of the consistency of the process flow.

7. The apparatus of claim 6, wherein the consistency meter is a microwave consistency meter.

8. The apparatus of claim 1, wherein the processor determines the slope of an acoustic ridge in the k-w plane to determine a parameter of the process flow flowing in the pipe.

9. The apparatus of claim 1, wherein the pressure signals are indication of vortical disturbances within the fluid flow.

10. The apparatus of claim 9, wherein the parameter of the fluid is one of velocity of the process flow and the volumetric flow of the process fluid.

11. The apparatus of claim 1, wherein the processor determines the slope of a convective ridge in the k-w plane to determine the velocity of the fluid flowing in the pipe.

12. The apparatus of claim 1, wherein the processor determines the volumetric flow rate of the fluid flowing in the pipe in response to the velocity of the fluid.